New Hampshire Volunteer River Assessment Program

EXETER RIVER

2001

Water Quality Monitoring Report

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

February 2003

NHDES-R-WD-03-9

STATE OF NEW HAMPSHIRE

Volunteer River Assessment Program

2001

EXETER RIVER

Water Quality Report

STATE OF NEW HAMPSHIRE
DEPARTMENT OF ENVIRONMENTAL SERVICES
6 HAZEN DRIVE
CONCORD, N.H. 03301

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February 2003

Printed on Recycled Paper

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1. ACKNOWLEDGEMENTS

The New Hampshire Department of Environmental Services-Volunteer River Assessment Program extends sincere thanks to the volunteers of the Exeter River group during 2001. This report was created solely from the data collected by the volunteers listed, below. It is their time and dedication that not only contributes to the amount of knowledge of rivers and streams in New Hampshire, but also expresses the genuine concern for local water resources.

Don Clement
Helen Clement
John Henson

2. VOLUNTEER RIVER ASSESSMENT PROGRAM OVERVIEW

The Volunteer River Assessment Program (VRAP) supports watershed organizations in their efforts to monitor river water quality. The primary focus of VRAP is to provide volunteers with river monitoring guidelines, equipment loans, and technical training. DES also incorporates applicable volunteer monitoring results into its evaluation of New Hampshire surface waters. Annual reports for each VRAP river include a summary of monitoring results and recommendations for future water quality sampling. VRAP aims to foster public understanding and stewardship of river systems and to increase available water quality information about New Hampshire rivers and streams.

VRAP loans and maintains water monitoring kits that include meters and supplies for on-site measurement of five basic water quality parameters: water temperature, dissolved oxygen, pH, specific conductance (conductivity), and turbidity. The investigation of these and additional parameters such as nutrients, metals, and bacteria is conducted by state water quality personnel and may be augmented by volunteer sampling. Sampling additional parameters comes with the cost of analysis, which can be covered by an assortment of fundraising activities such as association membership fees, special events, and in-kind services (non-monetary contributions from individuals and organizations), and grant writing.

Water quality measurements repeated over time create a picture of the fluctuating conditions in rivers and streams and help to determine where improvements, restoration or preservation may benefit the river and the communities it supports. Water quality results are also used to determine if a river is meeting surface water quality standards. Volunteer monitoring results meeting DES's Quality Assurance and Quality Control (QA/QC) requirements supplement the efforts of DES to assess the condition of New Hampshire surface waters. The New Hampshire Surface Water Quality Regulations are available through the DES Public Information Center at www.des.state.nh.us/wmb/Env-Ws1700.pdf or (603) 271-1975.

VRAP typically recommends sampling every other week during the summer, and citizen monitoring groups are encouraged to organize a long-term sampling program in order to begin to determine trends in river conditions. Each year volunteers arrange a sampling schedule and design in cooperation with the VRAP Coordinator. Project designs are created through a review and discussion of existing water quality information, such as known and perceived problem areas or locations of exceptional water quality. The interests, priorities, and resources of the partnership determine monitoring locations, parameters, and frequency.

Each VRAP volunteer must attend an annual training session to receive a demonstration of monitoring protocols and sampling techniques. Training sessions are an opportunity for volunteers to come together and receive an updated version of monitoring techniques. Training sessions are typically conducted outdoors near surface waters for an interactive demonstration. During the training volunteers have a chance to practice using the VRAP equipment and may also receive instruction in the collection of samples for laboratory

analysis. Training is accomplished in approximately three hours, after which volunteers are certified in the care, calibration, and use of the VRAP equipment.

VRAP groups conduct sampling according to a prearranged monitoring schedule and VRAP protocols. VRAP aims to visit volunteers during scheduled sampling events to verify that volunteers successfully follow the VRAP protocols. If necessary, volunteers are re-trained during the visit, and the group's monitoring coordinator is notified of the result of the verification visit. Volunteers forward water quality results to the VRAP Coordinator for incorporation into an annual report and state water quality assessment activities.

Applicable volunteer data are input to a water quality database, and considered (along with other reliable sources of data) during periodic DES water quality assessments. Assessment results and the methodology used to assess surface waters are published by DES every two years (i.e., Section 305(b) Water Quality Reports) as required by the federal Clean Water Act.

More than fifty VRAP volunteers sampled seven rivers regularly during the year 2001. VRAP 2001 rivers include the Exeter, Lamprey, Cocheco, Powwow, Sugar, Ashuelot, and Oyster rivers, as well as preliminary sampling on several additional rivers and streams. These accomplishments were made possible by the hard work and dedication of citizen volunteers and many additional people who helped to plan, support, and carry out these monitoring efforts.

3. PROJECT SUMMARY: EXETER RIVER VRAP 2001

The Exeter River VRAP team, consisting of Don and Helen Clement and John Henson, concluded the fourth year of water monitoring on the Exeter River. This effort provides water quality data from the Exeter River relative to surface water quality standards. In addition, the ongoing effort allows for an understanding of the river's dynamics, or variations on a station-by-station and year-to-year basis. The data can also serve as a baseline from which to determine any water pollution problems in the river and/or watershed.

4. RESULTS, DISCUSSION, AND RECOMMENDATIONS

This section includes a description of the Exeter River VRAP 2001 monitoring locations and results, a discussion of the results in comparison with New Hampshire water quality standards, and recommendations for future sampling and watershed investigations. The VRAP monitoring locations, "stations", are discussed from upstream to downstream (see Appendix A for a list of stations). Results are presented in graphs and text prepared by VRAP, and tables including all monitoring results from each station are located in Appendix B. The discussion of the results includes recommendations for future sampling and investigations that will contribute to the assessment of water quality conditions.

The water quality information collected at each station is summarized in a table that provides the reader with an overview of the monitoring activities and results. The table can be used as a quick reference for the reader; results not meeting state water quality criteria do not necessarily indicate a violation of water quality standards. The summary table indicates: (1) the number and type of samples collected, (2) the number of samples collected according to quality assurance and quality control requirements, (3) the number of samples not meeting state water quality criteria, (4) the range of the measurements, and (5) abbreviated water quality standards.

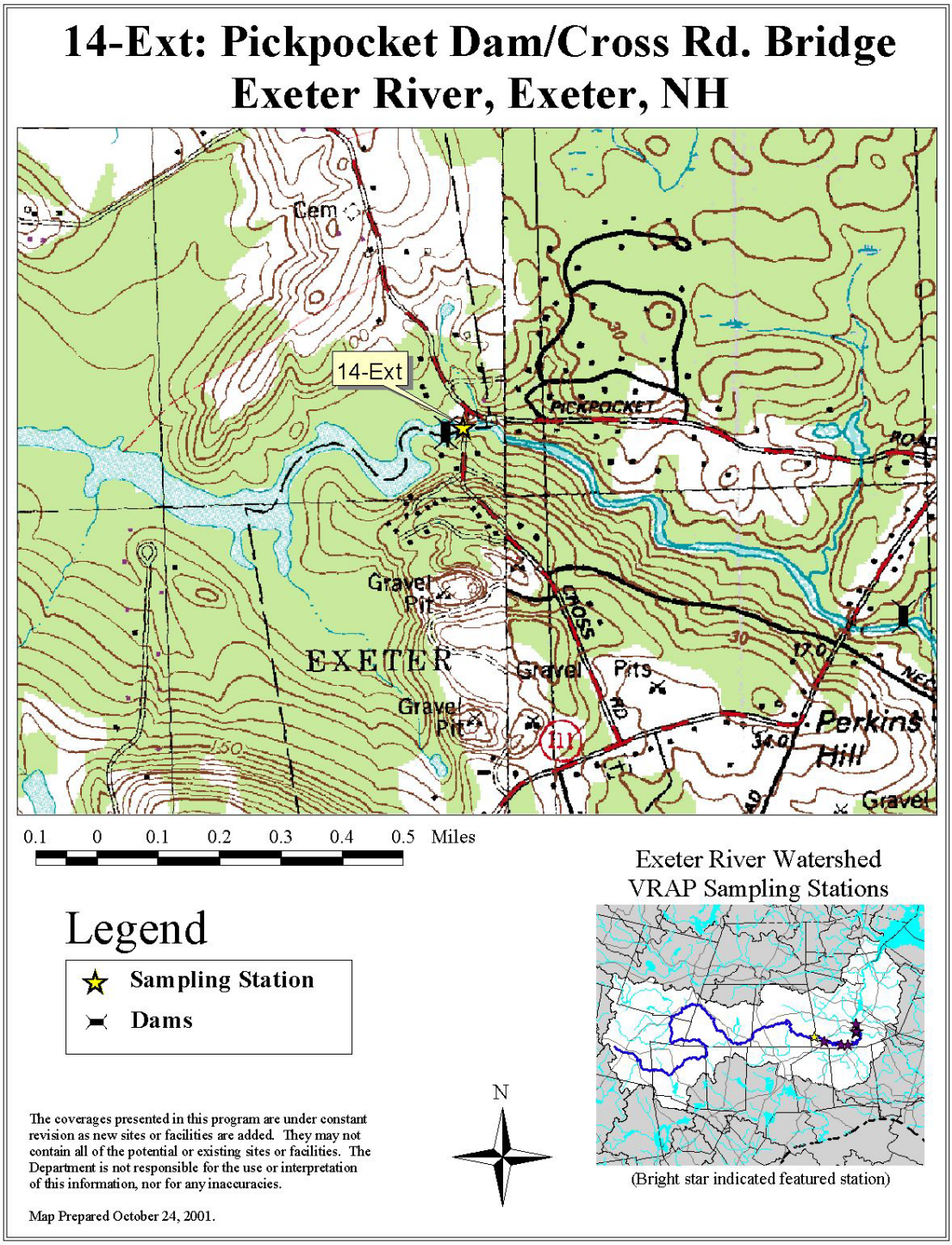
The presentation and discussion of the volunteer results focuses primarily on three parameters: DO, temperature, pH, and bacteria. These parameters are the core of the VRAP monitoring system, and have relatively straightforward standards that lend themselves to the assessment of individual results. These results can contribute directly to the determination of fishable and swimmable river and stream conditions, which is often a primary volunteer monitoring goal. This section includes graphs of dissolved oxygen (DO) concentrations with water temperature, and *E. coli* bacteria results (if collected). Please see Appendix C for descriptions of the water quality parameters analyzed under VRAP during 2001 and the associated New Hampshire surface water quality standards (SWQS) for Class B waters.

VRAP aims to provide a mechanism for citizens to contribute to the ongoing process of surface water quality assessment. Recommendations for future monitoring activities and watershed investigations are included in this report following the results and discussion. Also included are recommendations for improvements in sampling techniques to encourage volunteers to adhere to quality assurance and control measures.

Volunteers are encouraged to sample their rivers and streams on a long-term basis. Much of the information volunteers collect profiles river and stream locations for the first time. Several (five to ten) years of good quality measurements will be needed to begin to decipher water quality trends and the status of rivers and streams relative to the New Hampshire surface water quality standards. Water quality data from the stretch of river sampled by volunteers are presented in graphs in Appendix D. These graphs are included in the report to show how water quality conditions change from upstream to downstream. The current report format will describe water quality conditions on a station-by-station basis.

All results generated by the Exeter River VRAP 2001 were collected using the VRAP Field Datasheet and Field Sampling Protocols, 2001 (see Appendix E).

4.1. 14-Ext: Pickpocket Dam/Cross Road Bridge, Exeter, NH



4.1.1. Results and Discussion

Five measurements were made in the field for dissolved oxygen (DO), turbidity, and conductivity, and four were made for pH using handheld meters (Table 1). All measurements and samples met the Quality Assurance and Quality Control (QA/QC) requirements. One pH measurement was below the Class B water quality standard. The DO concentration data do not show any apparent DO problems, but these data alone do not accurately characterize DO relative to the surface water quality standards (see explanation in Section 4.1.1.1, below).

Table 1. Monitoring Summary: 14-Ext. VRAP, Year 2001.

Parameter	Samples Collected	Samples Meeting QA/QC Requirements	Acceptable Samples Not Meeting State Criteria	Data Range	Standards*
DO (mg/L)	5	5	0	7.91 - 8.57	>5
DO (% sat.)	5	5	0	89.5 - 98.4	>75
pH (std. units)	4	4	1	6.44 - 6.89	6.5-8.0
Turbidity (NTU)	5	5	0	1.5 - 3.62	<10 above background
Conductivity (μmho/cm)	5	5	0	94.8 - 161.4	NA

***Abbreviated standard values have been used in this table for quick reference. Please see Env-Ws 1700 and RSA 485-A:8 for complete Surface Water Quality Regulations.**

4.1.1.1. Dissolved Oxygen

Dissolved oxygen in the river at 14-Ext remained well above the minimum required concentration of 5 mg/L (see Figure 1). The Class B New Hampshire surface water quality standard for DO is a minimum concentration of 5.0 mg/L **and** minimum saturation of 75%. In other words, there are criteria for both concentration and saturation that must be met before the river can be considered as meeting DO standards. An accurate determination of whether the DO standard is met for % saturation can only be done using multiple measurements of saturation collected during any single day.

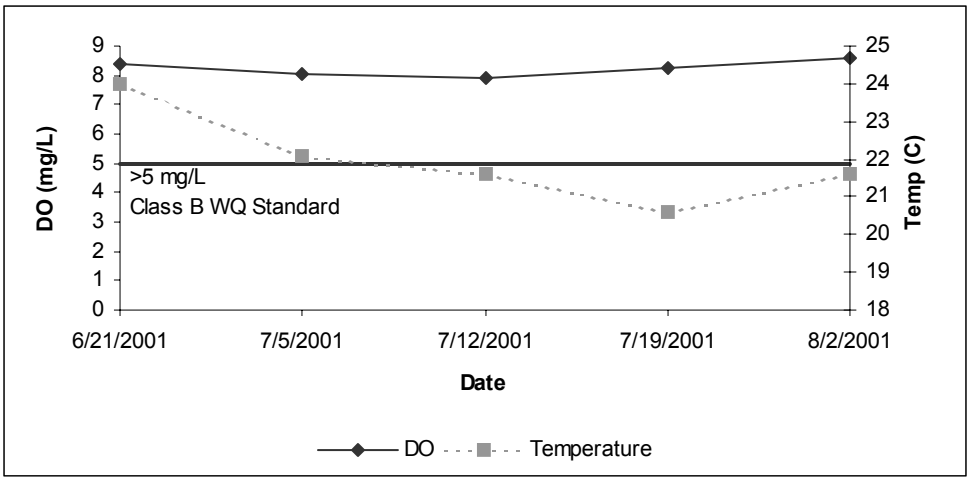


Figure 1. Dissolved Oxygen (DO) Concentration vs. Temperature. Exeter River at 14-Ext, Pickpocket Dam/Cross Road Bridge, Exeter, NH. VRAP, Year 2001.

4.1.1.2. pH

The pH at this location, ranging from 6.44 to 6.89, was measured below the state standard range on one of four monitoring dates. Station conditions are considered along with pH measurements because of the narrative portion of the pH standard. If the sampling location is influenced by natural conditions, low pH measurements are not considered a violation of water quality standards. RSA 485-A:8 states that pH of Class B waters *shall be between 6.5 and 8.0, except when due to natural causes*. The pH of surface waters can be affected by soil, subsurface bedrock, and wetlands near the river or stream. In addition, rain and snow falling in New Hampshire is relatively acidic, which can also affect pH levels. Additional sampling is needed at this station.

4.1.2. Recommendations

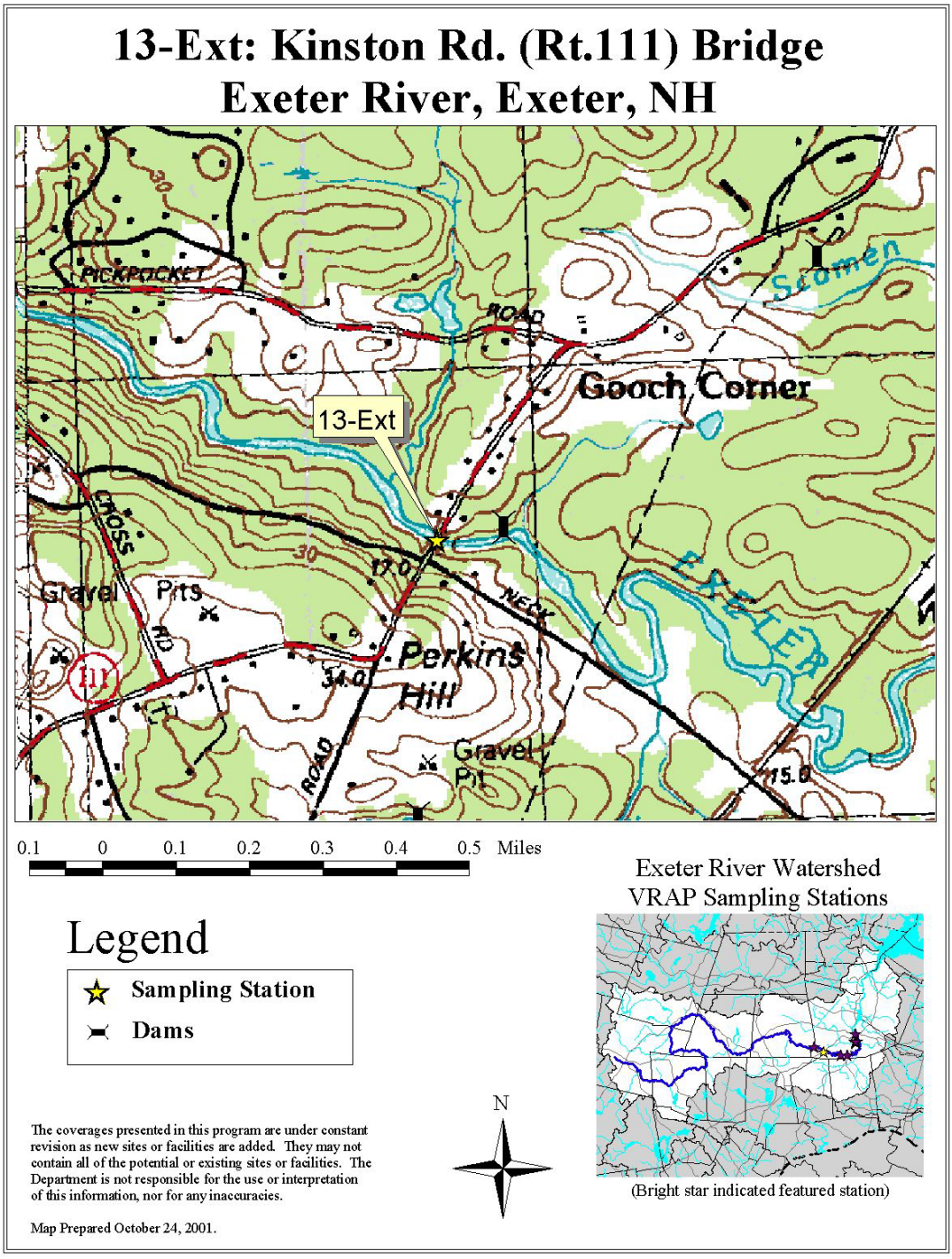
- *Baseline Monitoring***:** Volunteers are encouraged to continue sampling for all parameters, especially DO and pH, at this station. More information in the baseline data set will allow for a better understanding of the variations that the river encounters during the year. In addition, this will allow for better documentation of water quality, as related to New Hampshire surface water quality standards.

  For an increased understanding of water quality conditions at the time of sampling, volunteers should remember to be specific about the weather conditions and other characteristics of the sampling station.

- *Dissolved Oxygen***:** Measurements should continually be made at this station on a routine basis. This will help document variations in the river, and provide early detection of changes in the river. As previously stated, there are criteria for both concentration **and** saturation that must be met before the river can be considered as meeting DO standards. Volunteers are encouraged to measure DO early in the early morning and during the mid-afternoon hours. This could be done by using a Hydrolab® DataSonde 4a multiprobe, which is an instrument that can collect data

at specific time intervals (e.g., every 1-hour). The instrument can be put in the stream and left alone for a period of several days. The use of this instrument is dependent upon availability, and requires coordination with DES.

4.2. 13-Ext: Kingston Road Bridge, Exeter, NH



4.2.1. Results and Discussion

Five measurements were made in the field for dissolved oxygen (DO), turbidity, and conductivity, and four were made for pH using handheld meters (Table 2). All measurements and samples met the Quality Assurance and Quality Control (QA/QC) requirements. The DO concentration data do not show any apparent DO problems, but these data alone do not accurately characterize DO relative to the surface water quality standards (see explanation in Section 4.2.1.1, below).

Table 2. Monitoring Summary: 13-Ext. VRAP, Year 2001.

Parameter	Samples Collected	Samples Meeting QA/QC Requirements	Acceptable Samples Not Meeting State Criteria	Data Range	Standards*
DO (mg/L)	5	5	0	7.56 - 8.47	>5
DO (% sat.)	5	5	0	87.1 - 99.4	>75
pH (std. units)	4	4	0	6.92 - 7.04	6.5-8.0
Turbidity (NTU)	5	5	0	0.85 - 3.03	<10 above background
Conductivity (μmho/cm)	5	5	0	148.2 - 176.5	NA

***Abbreviated standard values have been used in this table for quick reference. Please see Env-Ws 1700 and RSA 485-A:8 for complete Surface Water Quality Regulations.**

4.2.1.1. Dissolved Oxygen

Figure 2 shows the DO concentrations during summer 2001. The Class B New Hampshire surface water quality standard for DO is a minimum concentration of 5.0 mg/L **and** minimum saturation of 75%. In other words, there are criteria for both concentration and saturation that must be met before the river can be considered as meeting DO standards. An accurate determination of whether the DO standard is met for % saturation can only be done using multiple measurements of saturation collected during any single day.

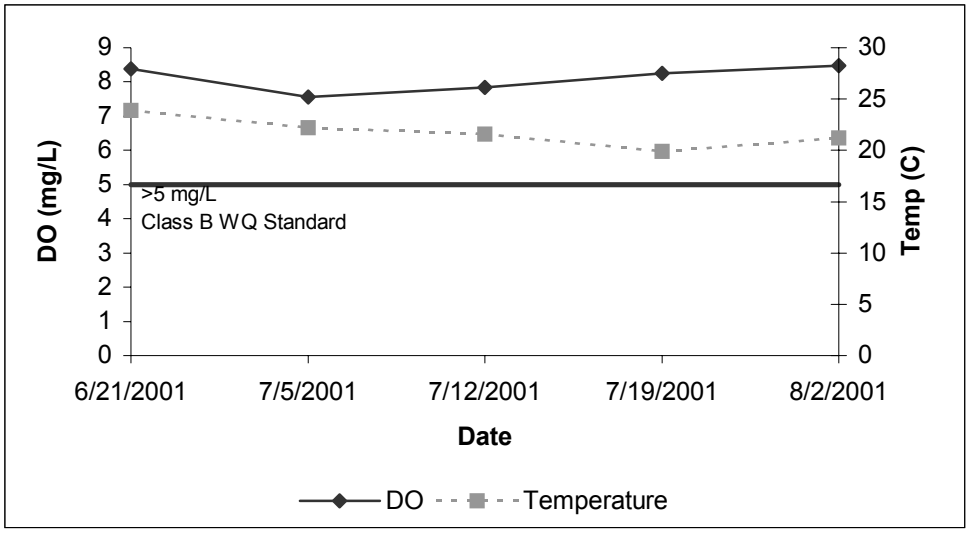


Figure 2. Dissolved Oxygen (DO) Concentration vs. Temperature. Exeter River at 13-Ext. Kinston Road Bridge, Exeter, NH. VRAP, Year 2001.

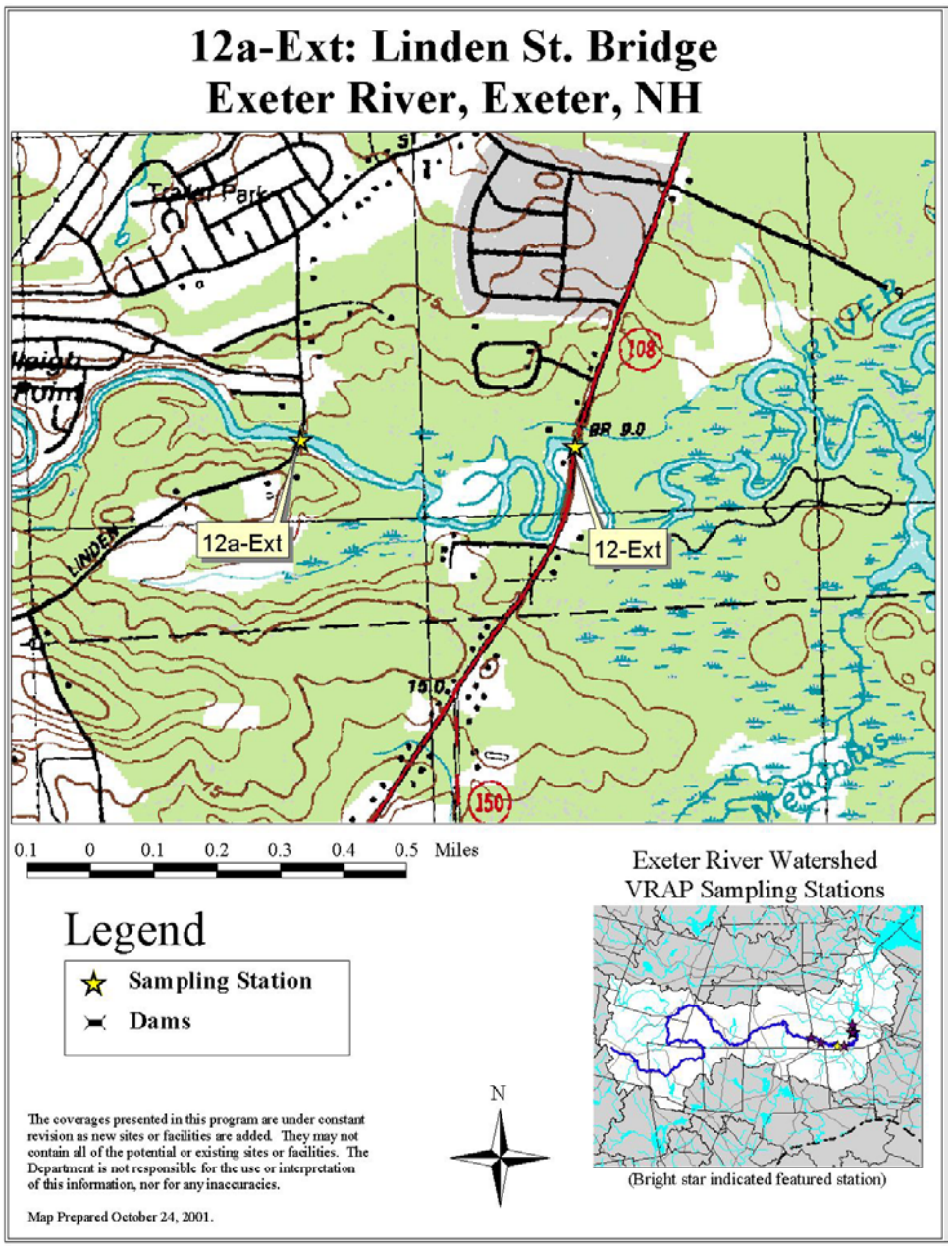
4.2.2. Recommendations

- *Baseline Monitoring***:** Volunteers are encouraged to continue sampling for all parameters, especially DO and pH, at this station. More information in the baseline data set will allow for a better understanding of the variations that the river encounters during the year. In addition, this will allow for better documentation of water quality, as related to New Hampshire surface water quality standards.

  For an increased understanding of water quality conditions at the time of sampling, volunteers should remember to be specific about the weather conditions and other characteristics of the sampling station.

- *Dissolved Oxygen***:** Measurements should continually be made at this station on a routine basis. This will help document variations in the river, and provide early detection of changes in the river. As previously stated, there are criteria for both concentration **and** saturation that must be met before the river can be considered as meeting DO standards. Volunteers are encouraged to measure DO early in the early morning and during the mid-afternoon hours. This could be done by using a Hydrolab® DataSonde 4a multiprobe, which is an instrument that can collect data at specific time intervals (e.g., every 1-hour). The instrument can be put in the stream and left alone for a period of several days. The use of this instrument is dependent upon availability, and requires coordination with DES.

4.3. 12a-Ext: Linden Street Bridge, Exeter, NH



4.3.1. Results and Discussion

Six measurements were made in the field for dissolved oxygen (DO), turbidity, and conductivity, and five were made for pH using handheld meters (Table 3). All measurements and samples met the Quality Assurance and Quality Control (QA/QC) requirements. The DO concentration data do not show any apparent DO problems, but these data alone do not accurately characterize DO relative to the surface water quality standards (see explanation in Section 4.3.1.1, below).

Table 3. Monitoring Summary: 12a-Ext. VRAP, Year 2001.

Parameter	Samples Collected	Samples Meeting QA/QC Requirements	Acceptable Samples Not Meeting State Criteria	Data Range	Standards*
DO (mg/L)	6	6	0	7.38 - 8.07	>5
DO (% sat.)	6	6	0	71.2 - 92.8	>75
pH (std. units)	5	5	0	6.87 - 7.06	6.5-8.0
Turbidity (NTU)	6	6	0	2 - 4.8	<10 above background
Conductivity (μmho/cm)	6	6	0	132.8 - 179.2	NA

***Abbreviated standard values have been used in this table for quick reference. Please see Env-Ws 1700 and RSA 485-A:8 for complete Surface Water Quality Regulations.**

4.3.1.1. Dissolved Oxygen

Figure 3 shows the DO concentrations during summer 2001. Dissolved oxygen in the river at 12a-Ext remained well above the minimum required concentration of 5 mg/L (see Figure 3). The Class B New Hampshire surface water quality standard for DO is a minimum concentration of 5.0 mg/L **and** minimum saturation of 75%. In other words, there are criteria for both concentration and saturation that must be met before the river can be considered as meeting DO standards. An accurate determination of whether the DO standard is met for % saturation can only be done using multiple measurements of saturation collected during any single day.

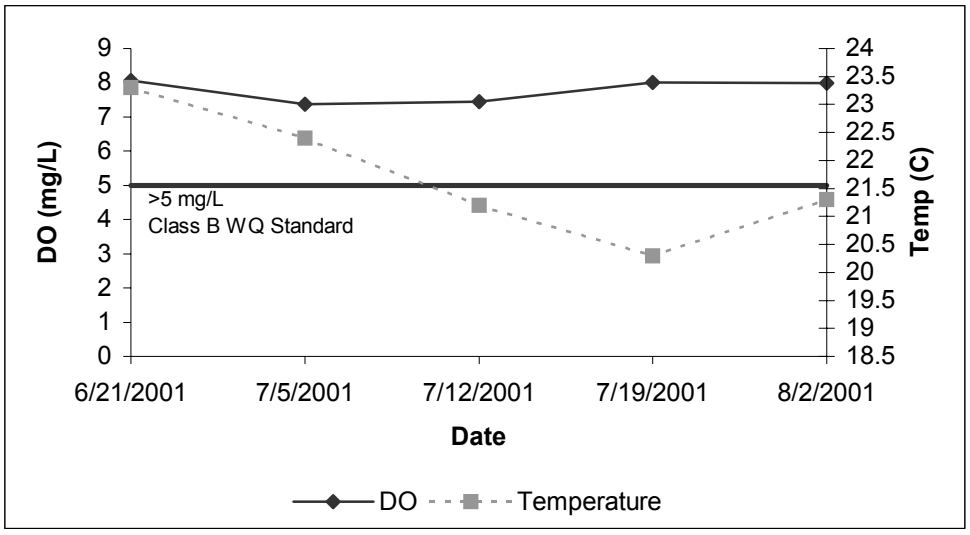


Figure 3. Dissolved Oxygen (DO) Concentration vs. Temperature. Exeter River at 12a-Ext, Linden Street Bridge, Exeter, NH. VRAP, Year 2001.

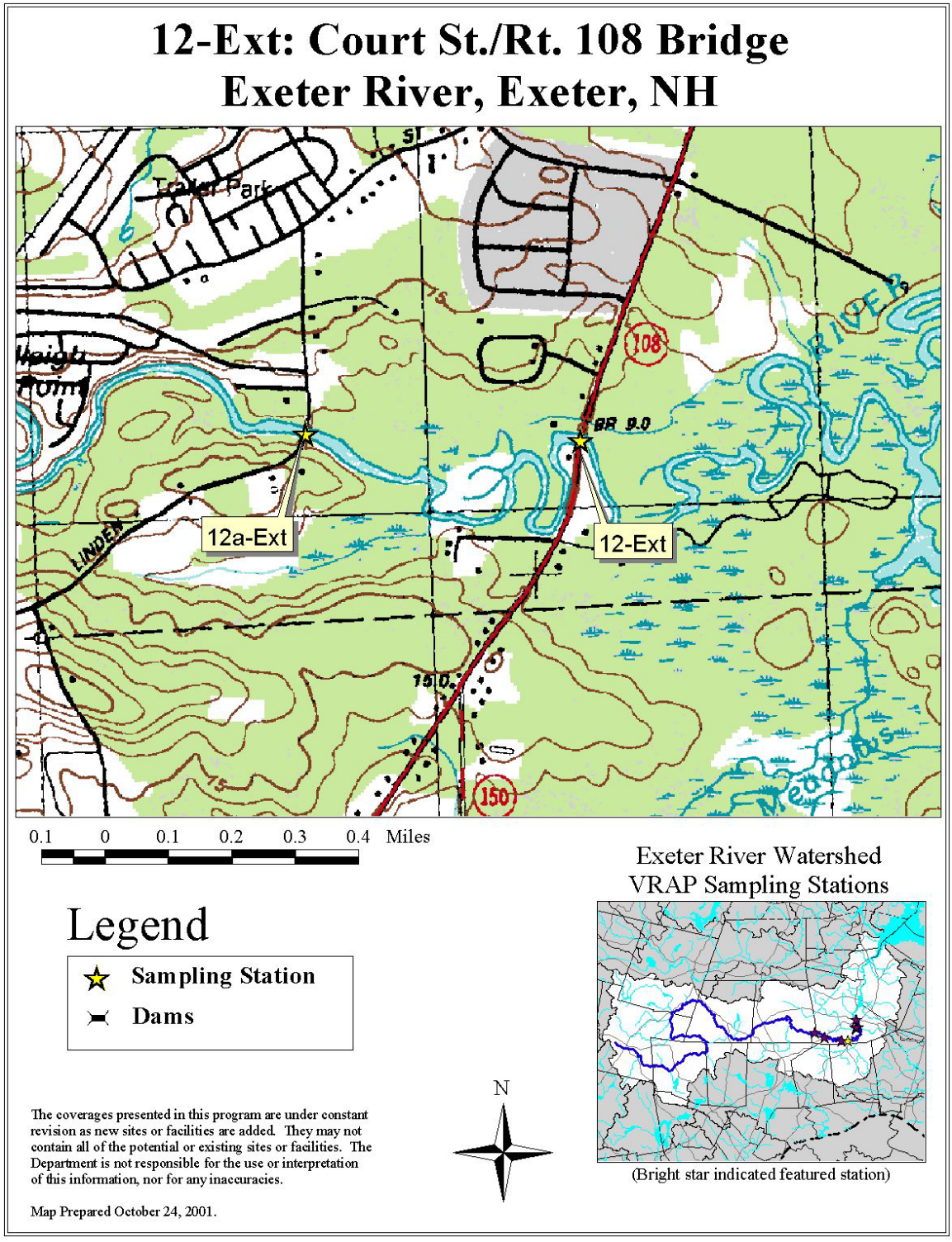
4.3.2. Recommendations

- *Baseline Monitoring***:** Volunteers are encouraged to continue sampling for all parameters, especially DO and pH, at this station. More information in the baseline data set will allow for a better understanding of the variations that the river encounters during the year. In addition, this will allow for better documentation of water quality, as related to New Hampshire surface water quality standards.

  For an increased understanding of water quality conditions at the time of sampling, volunteers should remember to be specific about the weather conditions and other characteristics of the sampling station.

- *Dissolved Oxygen***:** Measurements should continually be made at this station on a routine basis. This will help document variations in the river, and provide early detection of changes in the river. As previously stated, there are criteria for both concentration **and** saturation that must be met before the river can be considered as meeting DO standards. Volunteers are encouraged to measure DO early in the early morning and during the mid-afternoon hours. This could be done by using a Hydrolab® DataSonde 4a multiprobe, which is an instrument that can collect data at specific time intervals (e.g., every 1-hour). The instrument can be put in the stream and left alone for a period of several days. The use of this instrument is dependent upon availability, and requires coordination with DES.

4.4. 12-Ext: Court Street Bridge, Exeter, NH



4.4.1. Results and Discussion

Five measurements were made in the field for dissolved oxygen (DO), turbidity, and conductivity, and four were made for pH using handheld meters (Table 4). All measurements and samples met the Quality Assurance and Quality Control (QA/QC) requirements. The DO concentration data do not show any apparent DO problems, but these data alone do not accurately characterize DO relative to the surface water quality standards (see explanation in Section 4.4.1.1, below).

Table 4. Monitoring Summary: 12-Ext. VRAP, Year 2001.

Parameter	Samples Collected	Samples Meeting QA/QC Requirements	Acceptable Samples Not Meeting State Criteria	Data Range	Standards*
DO (mg/L)	5	5	0	6.71 - 7.87	>5
DO (% sat.)	5	5	0	77.3 - 90.3	>75
pH (std. units)	4	4	0	7.06 - 7.14	6.5-8.0
Turbidity (NTU)	5	5	0	2.4 - 4.7	<10 above background
Conductivity (μmho/cm)	5	5	0	148.5 - 175.5	NA

***Abbreviated standard values have been used in this table for quick reference. Please see Env-Ws 1700 and RSA 485-A:8 for complete Surface Water Quality Regulations.**

4.4.1.1. Dissolved Oxygen

Figure 4 shows the DO concentrations during summer 2001. Dissolved oxygen in the river at 12-Ext remained well above the minimum required concentration of 5 mg/L (see Figure 4). The Class B New Hampshire surface water quality standard for DO is a minimum concentration of 5.0 mg/L **and** minimum saturation of 75%. In other words, there are criteria for both concentration and saturation that must be met before the river can be considered as meeting DO standards. An accurate determination of whether the DO standard is met for % saturation can only be done using multiple measurements of saturation collected during any single day.

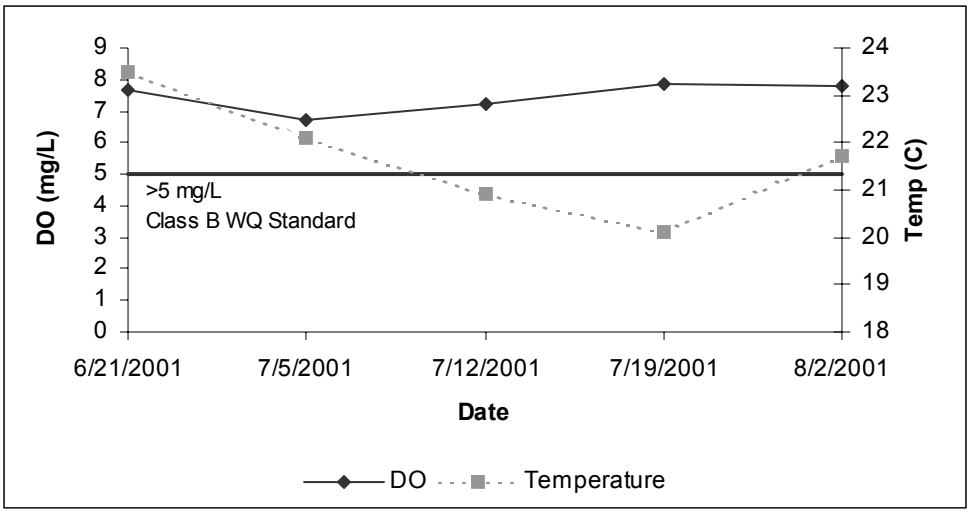


Figure 4. Dissolved Oxygen (DO) Concentration vs. Temperature. Exeter River at 12-Ext, Court Street Bridge, Exeter, NH. VRAP, Year 2001.

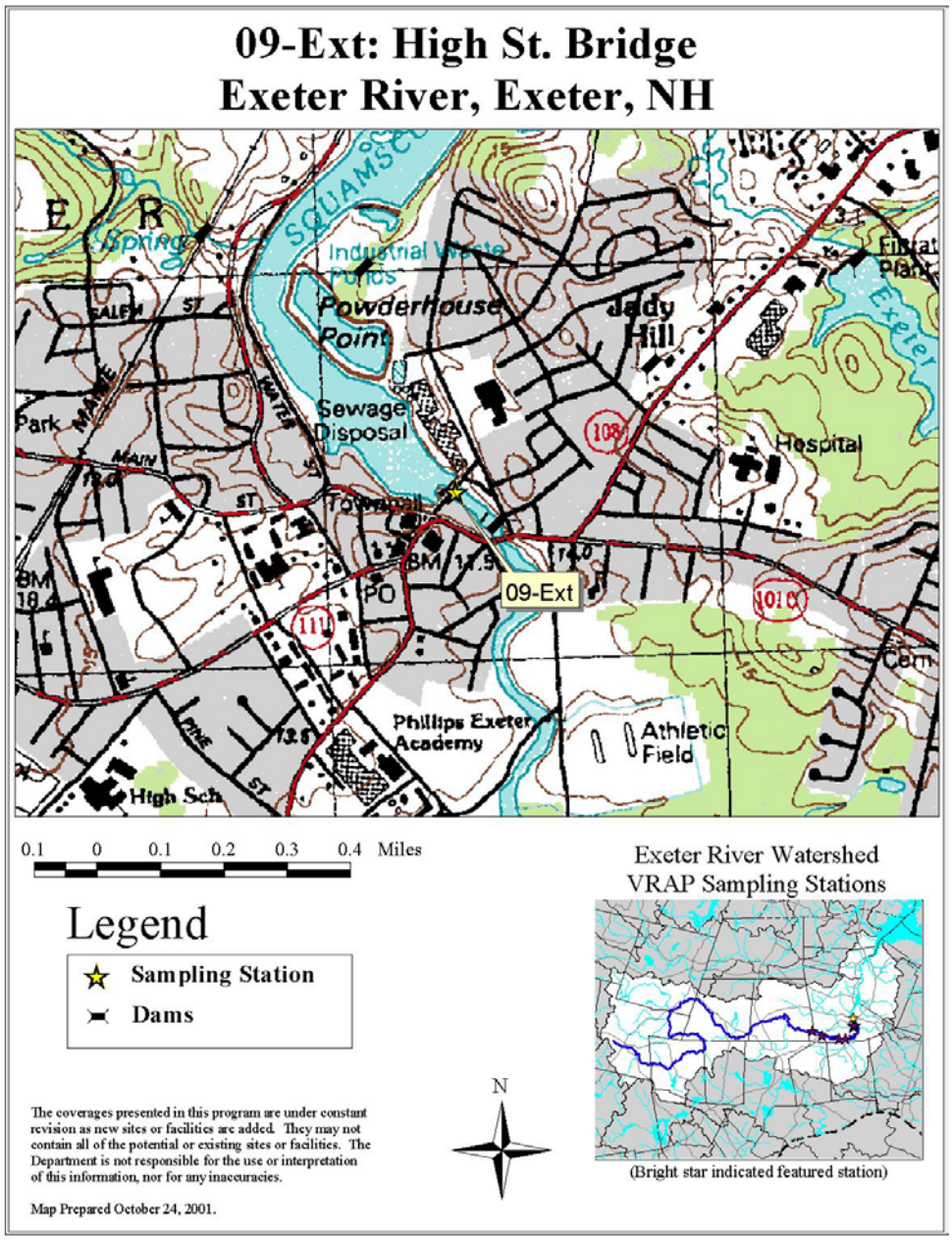
4.4.2. Recommendations

- *Baseline Monitoring*: Volunteers are encouraged to continue sampling for all parameters, especially DO and pH, at this station. More information in the baseline data set will allow for a better understanding of the variations that the river encounters during the year. In addition, this will allow for better documentation of water quality, as related to New Hampshire surface water quality standards.

  For an increased understanding of water quality conditions at the time of sampling, volunteers should remember to be specific about the weather conditions and other characteristics of the sampling station.

- *Dissolved Oxygen*: Measurements should continually be made at this station on a routine basis. This will help document variations in the river, and provide early detection of changes in the river. As previously stated, there are criteria for both concentration **and** saturation that must be met before the river can be considered as meeting DO standards. Volunteers are encouraged to measure DO early in the early morning and during the mid-afternoon hours. This could be done by using a Hydrolab® DataSonde 4a multiprobe, which is an instrument that can collect data at specific time intervals (e.g., every 1-hour). The instrument can be put in the stream and left alone for a period of several days. The use of this instrument is dependent upon availability, and requires coordination with DES.

4.5. 09-Ext: High Street Bridge, Exeter, NH



4.5.1. Results and Discussion

Five measurements were made in the field for dissolved oxygen (DO), turbidity, and conductivity, and four were made for pH using handheld meters (Table 5). All measurements and samples met the Quality Assurance and Quality Control (QA/QC) requirements. One DO saturation measurement was below 75%, and all DO concentration data do not show any apparent DO problems. However, these data alone do not accurately characterize DO relative to the surface water quality standards (see explanation in Section 4.5.1.1, below).

Table 5. Monitoring Summary: 09-Ext. VRAP, Year 2001.

Parameter	Samples Collected	Samples Meeting QA/QC Requirements	Acceptable Samples Not Meeting State Criteria	Data Range	Standards*
DO (mg/L)	5	5	0	6.04 - 7.97	>5
DO (% sat.)	5	5	1	71.2 - 92.8	>75
pH (std. units)	4	4	0	6.87 - 7.06	6.5-8.0
Turbidity (NTU)	5	5	0	2 - 4.8	<10 above background
Conductivity (μmho/cm)	5	5	0	132.8 - 179.2	NA

***Abbreviated standard values have been used in this table for quick reference. Please see Env-Ws 1700 and RSA 485-A:8 for complete Surface Water Quality Regulations.**

4.5.1.1. Dissolved Oxygen

Figure 5 shows the DO concentrations during summer 2001. The Class B New Hampshire surface water quality standard for DO is a minimum concentration of 5.0 mg/L **and** minimum saturation of 75%. In other words, there are criteria for both concentration and saturation that must be met before the river can be considered as meeting DO standards. An accurate determination of whether the DO standard is met for % saturation can only be done using multiple measurements of saturation collected during any single day.

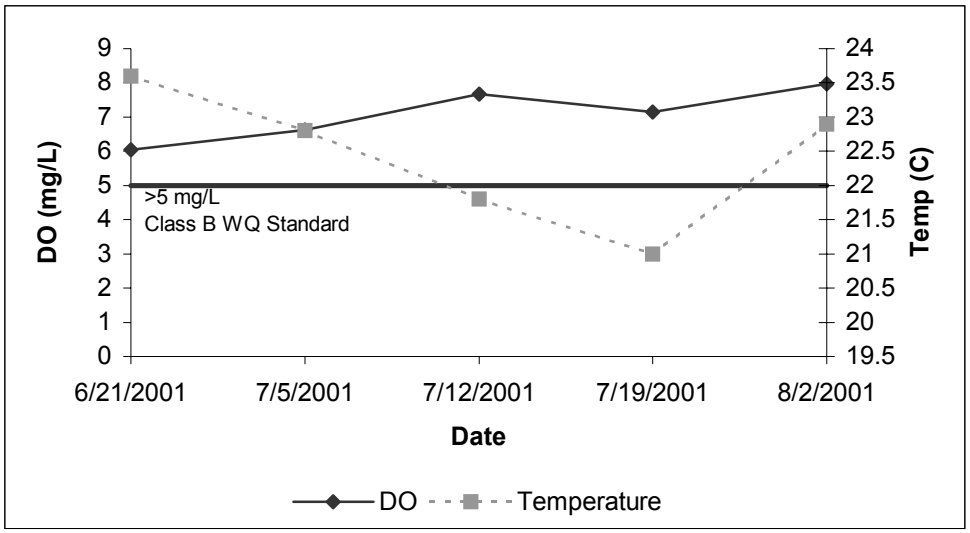


Figure 5. Dissolved Oxygen (DO) Concentration vs. Temperature. Exeter River at 09-Ext, High Street Bridge, Exeter, NH. VRAP, Year 2001.

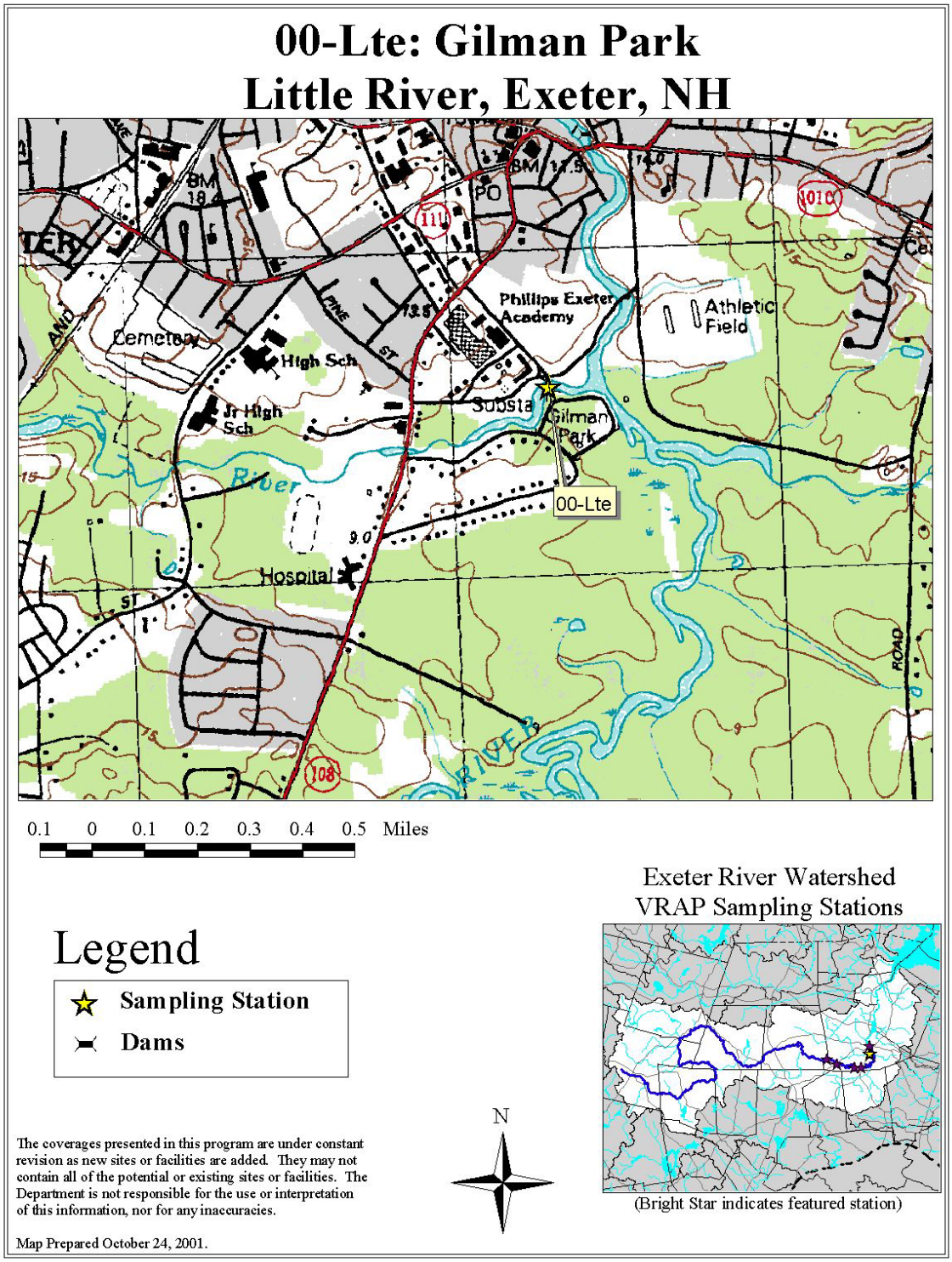
4.5.2. Recommendations

- *Baseline Monitoring***:** Volunteers are encouraged to continue sampling for all parameters, especially DO and pH, at this station. More information in the baseline data set will allow for a better understanding of the variations that the river encounters during the year. In addition, this will allow for better documentation of water quality, as related to New Hampshire surface water quality standards.

  For an increased understanding of water quality conditions at the time of sampling, volunteers should remember to be specific about the weather conditions and other characteristics of the sampling station.

- *Dissolved Oxygen***:** Measurements should continually be made at this station on a routine basis. This will help document variations in the river, and provide early detection of changes in the river. As previously stated, there are criteria for both concentration **and** saturation that must be met before the river can be considered as meeting DO standards. Volunteers are encouraged to measure DO early in the early morning and during the mid-afternoon hours. This could be done by using a Hydrolab® DataSonde 4a multiprobe, which is an instrument that can collect data at specific time intervals (e.g., every 1-hour). The instrument can be put in the stream and left alone for a period of several days. The use of this instrument is dependent upon availability, and requires coordination with DES.

4.6. 00-Lte: Little River, Gilman Park, Exeter, NH



4.6.1. Results and Discussion

Five measurements were made in the field for dissolved oxygen (DO), turbidity, and conductivity, and four were made for pH using handheld meters (Table 6). All measurements and samples met the Quality Assurance and Quality Control (QA/QC) requirements. One DO saturation and one DO concentration measurement was below standards. However, these data alone do not accurately characterize DO relative to the surface water quality standards (see explanation in Section 4.6.1.1, below).

Table 6. Monitoring Summary: 00-Lte. VRAP, Year 2001.

Parameter	Samples Collected	Samples Meeting QA/QC Requirements	Acceptable Samples Not Meeting State Criteria	Data Range	Standards*
DO (mg/L)	5	5	1	4.69 - 8.77	>5
DO (% sat.)	5	5	1	54.5 - 99.6	>75
pH (std. units)	4	4	0	6.89 - 7.12	6.5-8.0
Turbidity (NTU)	5	5	0	3.9 - 8.3	<10 above background
Conductivity (µmho/cm)	5	5	0	142.3 - 198.1	NA

***Abbreviated standard values have been used in this table for quick reference. Please see Env-Ws 1700 and RSA 485-A:8 for complete Surface Water Quality Regulations.**

4.6.1.1. Dissolved Oxygen

Figure 6 shows the DO concentrations during summer 2001. The instantaneous DO standard (5.0 mg/L) was not met on one occasion, which indicates a potential problem. The Class B New Hampshire surface water quality standard for DO is a minimum concentration of 5.0 mg/L **and** minimum saturation of 75%. In other words, there are criteria for both concentration and saturation that must be met before the river can be considered as meeting DO standards. An accurate determination of whether the DO standard is met for % saturation can only be done using multiple measurements of saturation collected during any single day.

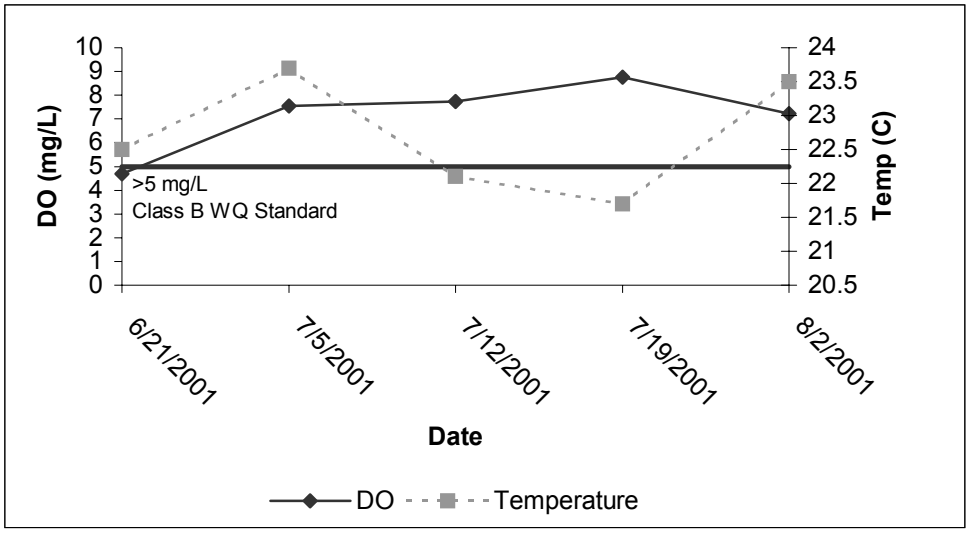


Figure 6. Dissolved Oxygen (DO) Concentration vs. Temperature. Little River at 00-Lte, Gilman Park, Exeter, NH. VRAP, Year 2001.

4.6.2. Recommendations

- *Baseline Monitoring***:** Volunteers are encouraged to continue sampling for all parameters, especially DO and pH, at this station. More information in the baseline data set will allow for a better understanding of the variations that the river encounters during the year. In addition, this will allow for better documentation of water quality, as related to New Hampshire surface water quality standards.

  For an increased understanding of water quality conditions at the time of sampling, volunteers should remember to be specific about the weather conditions and other characteristics of the sampling station.

- *Dissolved Oxygen***:** Measurements should continually be made at this station on a routine basis. This will help document variations in the river, and provide early detection of changes in the river. As previously stated, there are criteria for both concentration **and** saturation that must be met before the river can be considered as meeting DO standards. Volunteers are encouraged to measure DO early in the early morning and during the mid-afternoon hours. This could be done by using a Hydrolab® DataSonde 4a multiprobe, which is an instrument that can collect data at specific time intervals (e.g., every 1-hour). The instrument can be put in the stream and left alone for a period of several days. The use of this instrument is dependent upon availability, and requires coordination with DES.

Appendix A:

List of Stations

Appendix B:

Raw Data Tables

Appendix C:

Parameters and Surface Water Quality Standards

Appendix D:

River Graphs

Appendix E:

Field Sampling Protocols